

The Application Note is pertinent to the Unidrive Classic, Unidrive SP, Mentor MP, Affinity and GP20 Drive Families

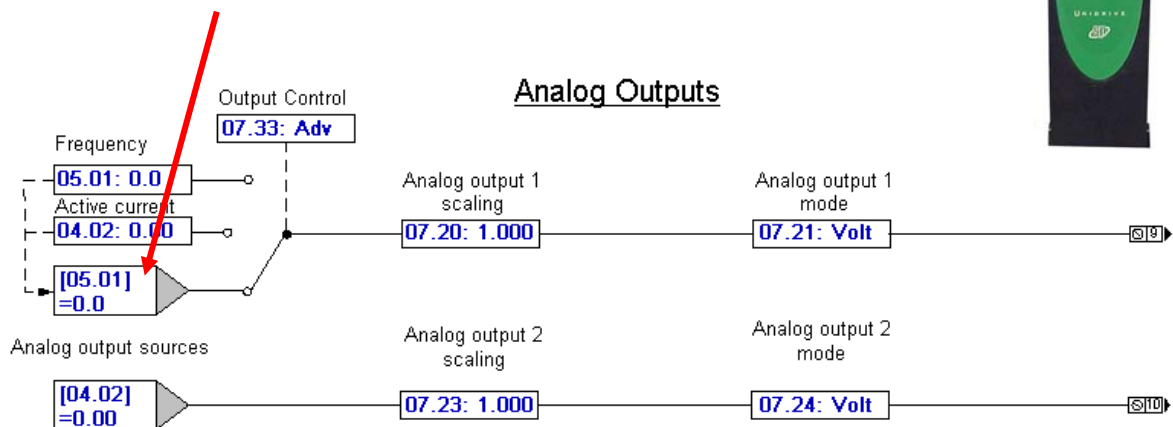
### Creating a UniPolar Analog Speed Output

On occasion customers use analog panel meters to indicate the motor or machine speed. Our drive typically assigns an analog output to provide a 0 to +/- 10v output proportional to the motor speed. This output will swing negative if the drive is commanded to Run Reverse. Therein lies the problem. Unless the analog meter is a zero center type, it will peg to the left of zero when the motor is commanded to run in reverse.

This application note will outline methods to create a UniPolar analog output for an analog meter.

#### For Unidrive SP, Affinity and GP20

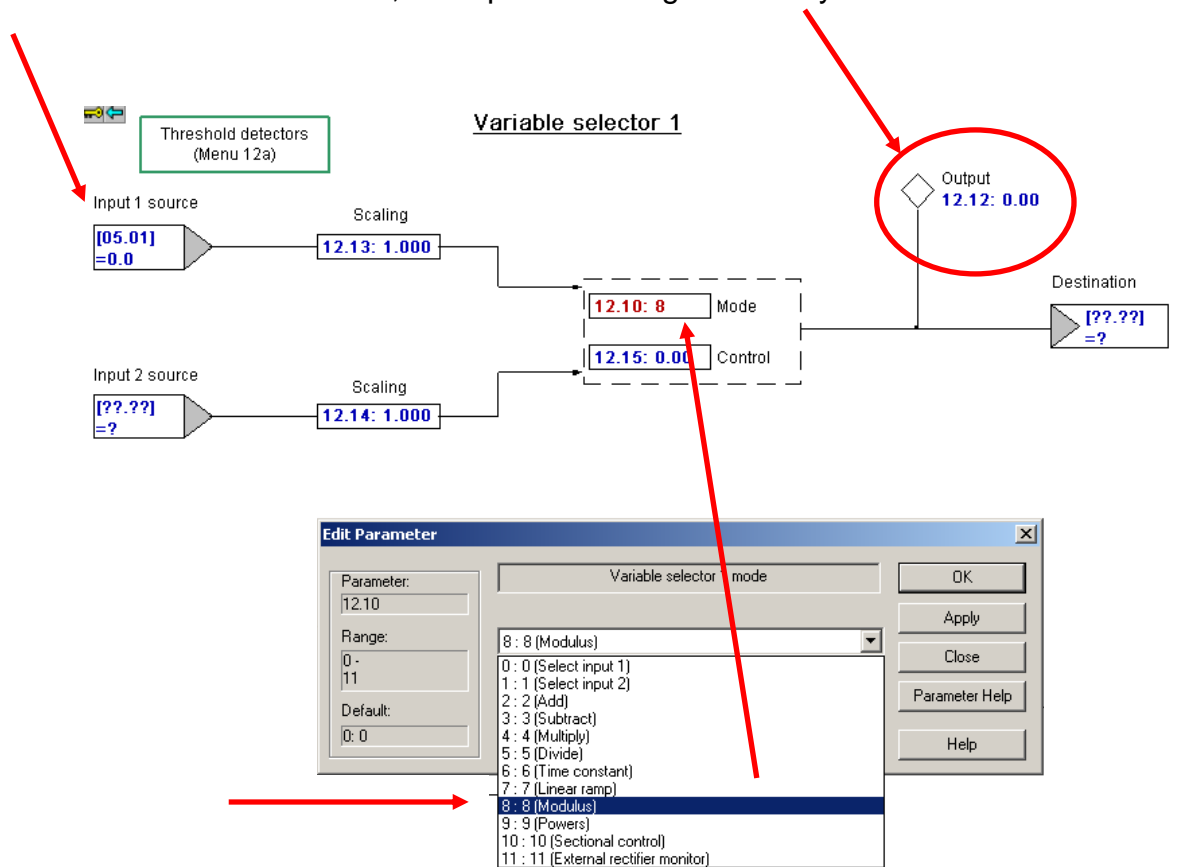
The normal factory defaults for Unidrive SP and GP20 assigns Terminal 9 analog output to be proportional to the drives output frequency- #5.01 in Open Loop or Motor RPM #3.02 in Closed Loop ( see #0.48 )



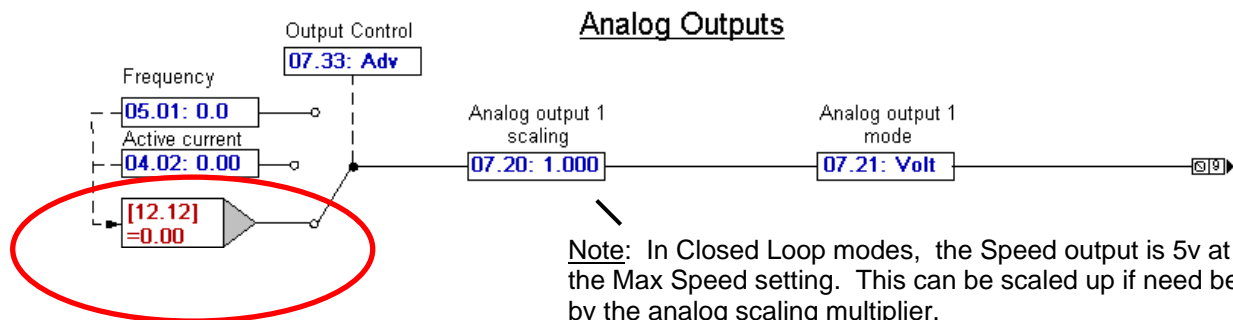
However, as stated above, this output will be positive in the forward direction and negative when operating in reverse.

In order to render this output strictly positive independent of direction, the Unidrive SP and GP20 all have a feature that allows one to take the Absolute value of a signal. This is accomplished using one of the Variable Selector function in Menu 12.

So, if we pick up #5.01 ( the bi-polar frequency ) and select the Modulus function – which means Absolute value, it will pass the magnitude only to #12.12.



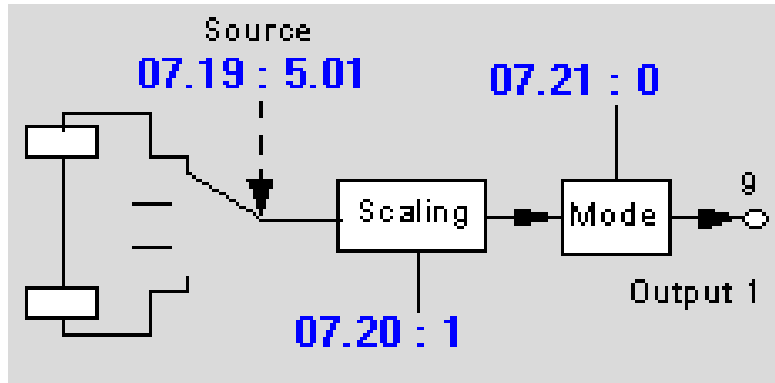
Now it is just a simple matter of assigning our analog output to this absolute value signal available at #12.12. For Unidrive SP and Commander GP20 the final assignment is shown below. ( Don't forget to Store to make these assignments take effect and remain )



## For Unidrive Classic

Unfortunately the Unidrive Classic did not have the Variable selectors as do the newer Unidrive SP series. So we have to come up with a couple different methods- which tends to be a little more complex - but it can be done !!

The normal factory defaults for Unidrive Classic assigns Terminal 9 analog output to be proportional to the drives output frequency- #5.01 in Open Loop or Motor RPM #3.02 in Closed Loop ( see #0.48 )



However, as stated above, this output will be positive in the forward direction and negative when operating in reverse.

Menu 10 contains a range of status bit indicating various drive status activity.  
Parameter #10.14 indicates the direction of drive activity.

Parameter	Description	Default	Memory
10.14	Direction running	0	0
10.15	Mains loss	0	0
10.16	Motor thermistor over temperature	0	0
10.17	Motor Overload alarm	0	0

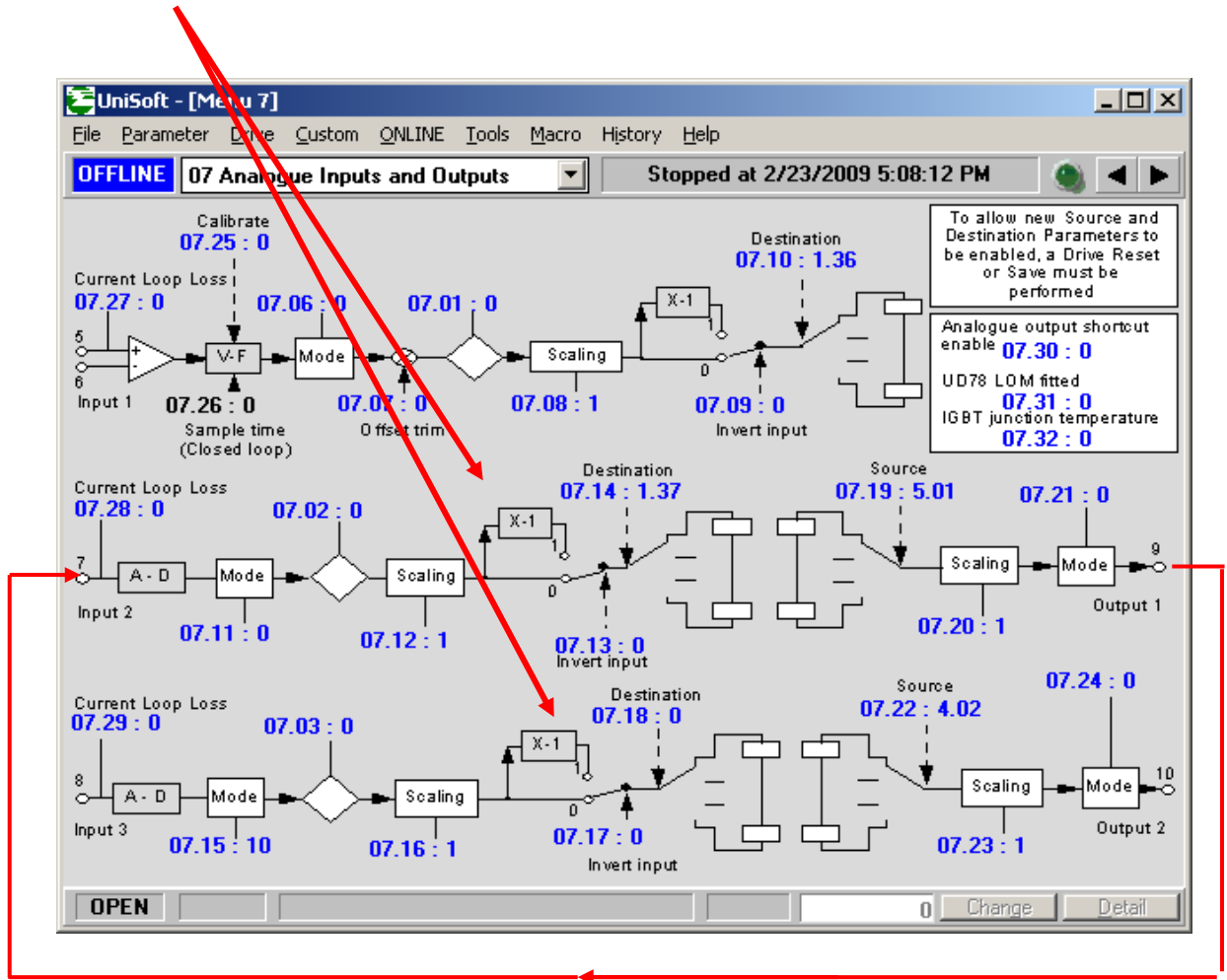
**Direction running**

Type: **ROB**  
 Default: **0**  
 Range: **1**  
 Units: **0**

On the open loop drive this bit is set if the post-ramp reference is negative (reverse), or reset if post-ramp reference is positive (forward). On the closed loop drive the speed feedback is monitored rather than the post-ramp reference.

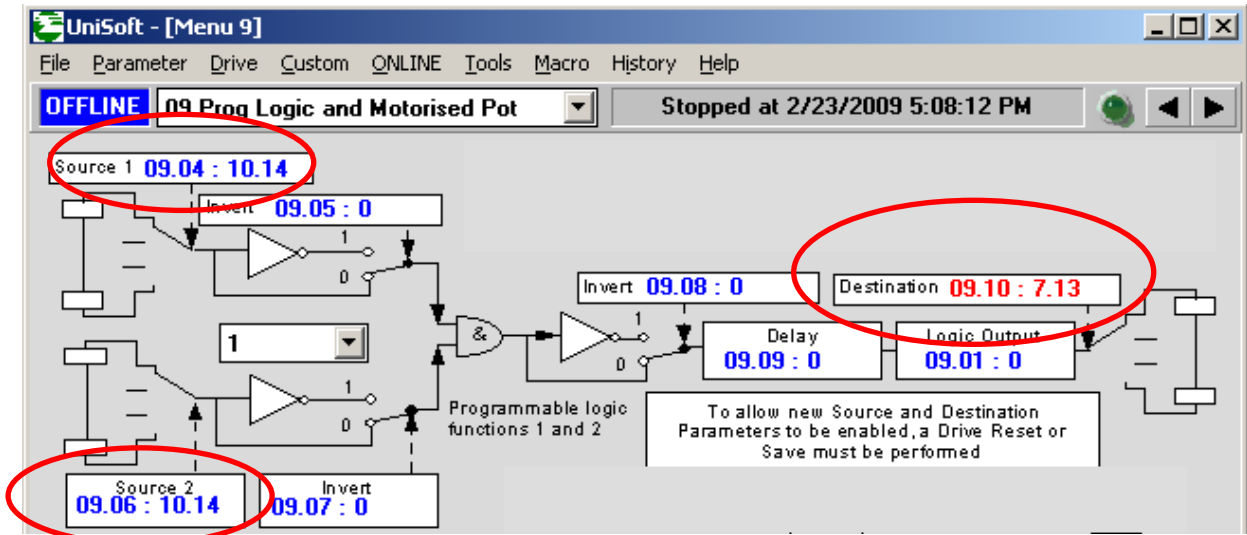
# Method 1

If we examine the Unidrive Classic analog inputs, you will see that the input polarity can be inverted.



So..... if we take the bi-polar analog output from terminal 9 and wire it to either terminal 7 or 8 whichever is free, perhaps we could invert the signal depending on the direction bit #10.14.

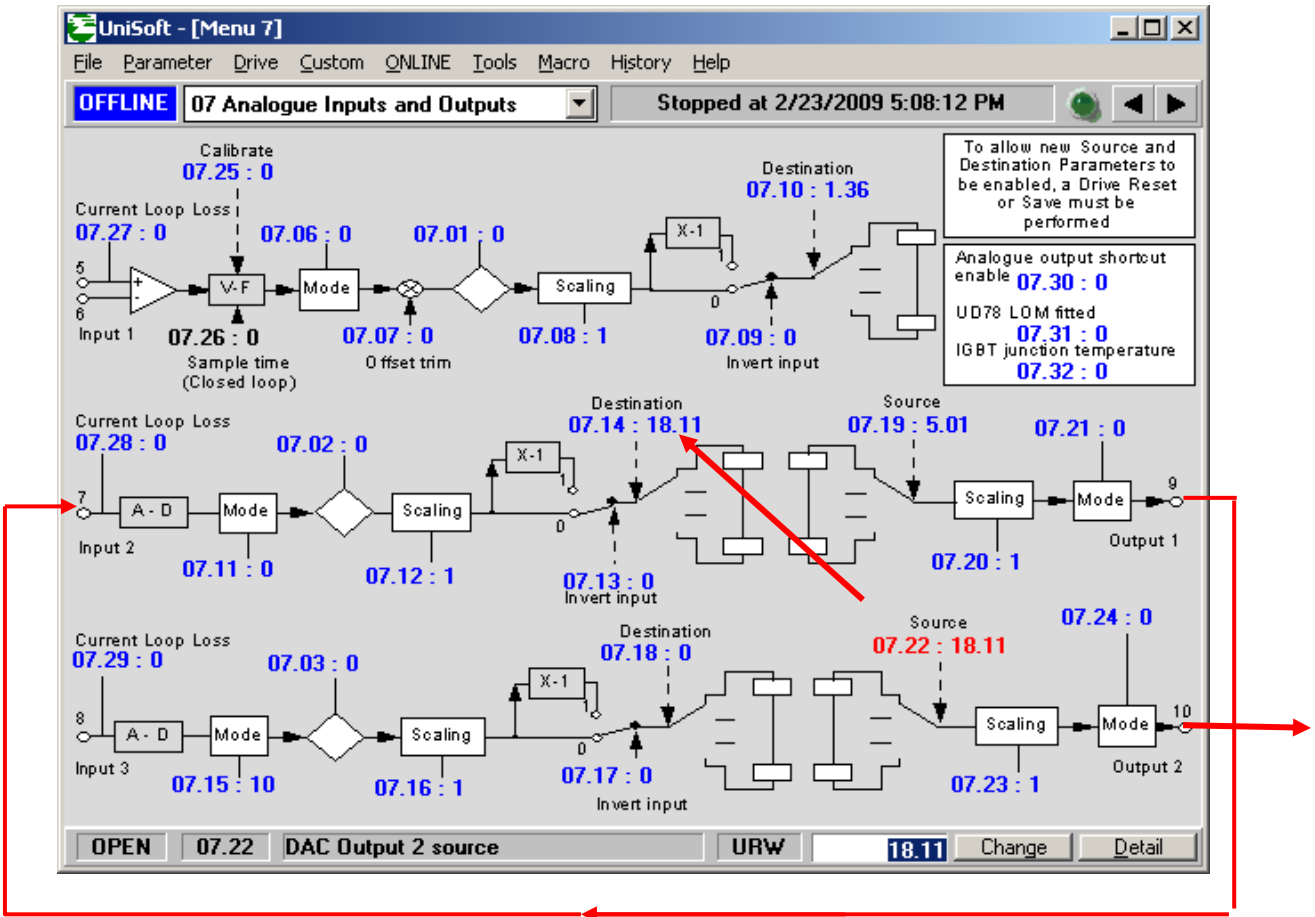
So now, we just need to get #10.14 directed to the inverter #7.13 or #7.17. For my purposes I chose, terminal 7 so I am going to invert using #7.13. In order to do this we could use one of the AND gates in Menu 9 for this routing.



Now we just need an intermediate place to direct the result of the analog input that is being inverted. We could use one of the free registers up in Menu 18. I chose #18.11.

Parameter	Description	Default	Memory
18.07	Volatile Application parameter	0	0
18.08	Volatile Application parameter	0	0
18.09	Volatile Application parameter	0	0
18.10	Volatile Application parameter	0	0
18.11	Application parameter	0	0
18.12	Application parameter	0	0
18.13	Application parameter	0	0

After this inversion, the absolute corrected value is available in #18.11 as a 0-32000 number, we can output this Absolute value using the other free D/A converter on terminal 10.



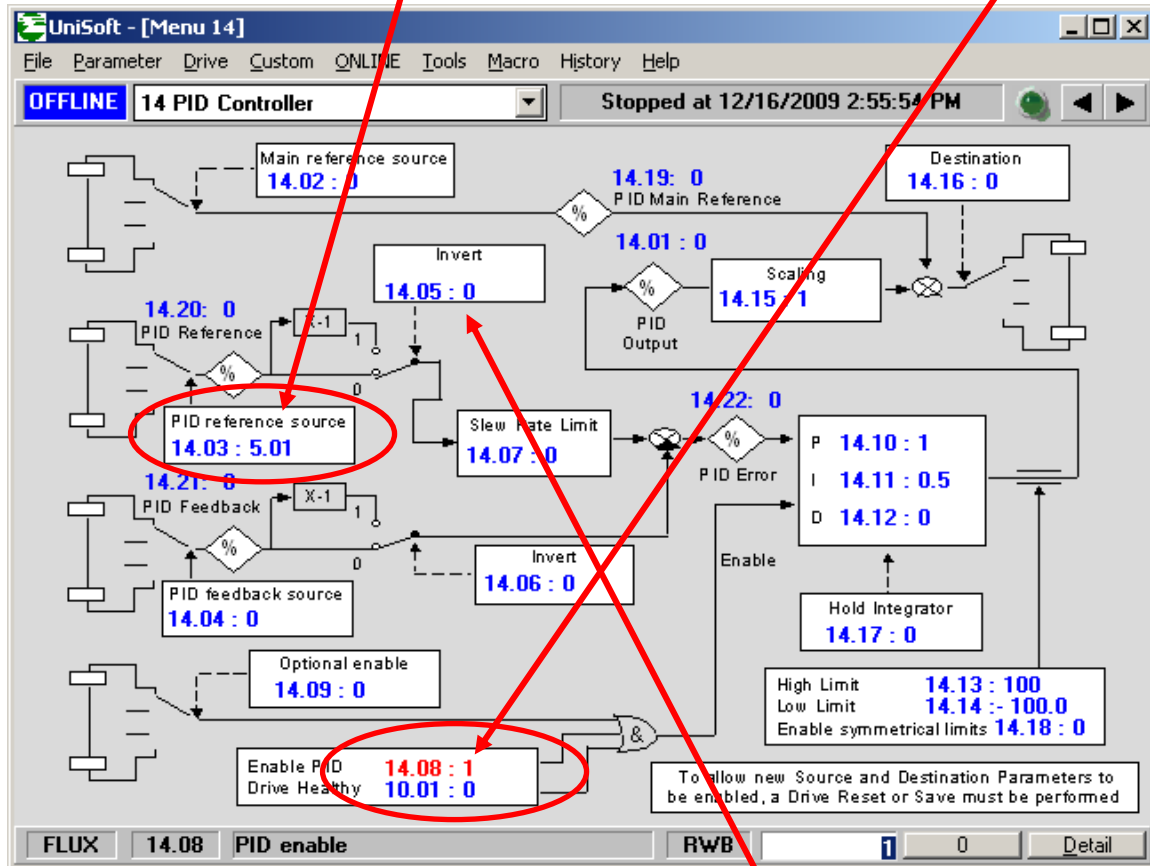
Our UniPolar ( Absolute Value ) speed signal is now available at terminal 10.

## Method 2

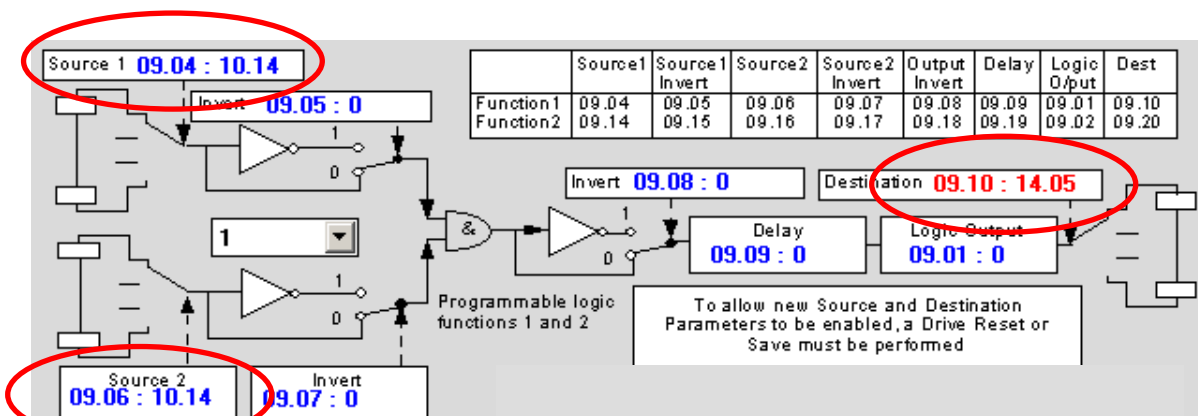
An obvious problem with Method 1, it depends on whether both analog outputs are free/not being used. If terminal 10 is already in use then there is another method but uses a portion of the PID function in Menu 14. Assuming this function is not being used, the following will describe how to create a UniPolar output from a bi-polar signal.

The first step is to set the PID input to refer to the bi-polar signal which would be either #5.01 in Open Loop or Motor RPM #3.02 in Closed Loop ( see #0.48 ). In the example below I was working with an Open Loop drive.

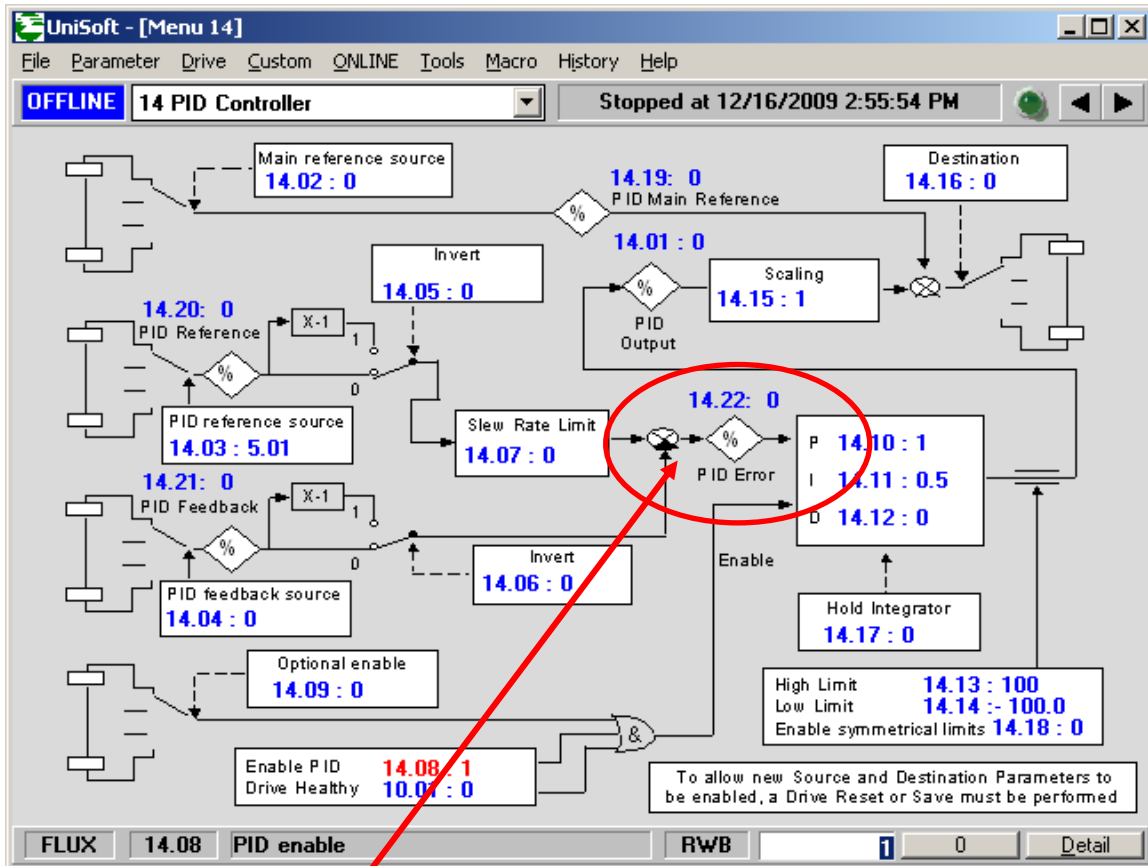
In order for menu 14 to become active it must be enabled.



A similar philosophy that was used in Method 1 will be used here also that will change the inverter at #14.05 based on the direction bit #10.14.



## Final Steps



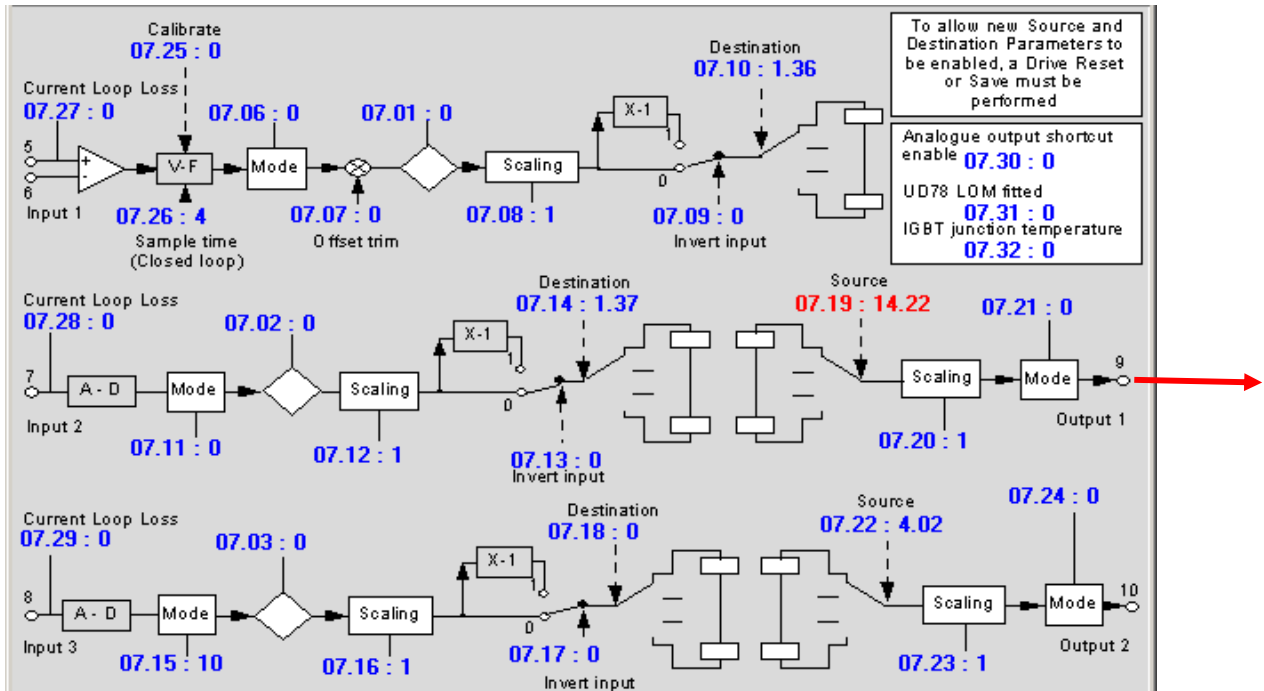
Parameter #14.22 will now contain the absolute ( unipolar ) value of the bi-polar signal as a 0 to 100% number.



# Assignment of the Analog Output

This register ( #14.22 ) will then be referenced to become the source of DAC#1.

The Uni-Polar signal will now be available at terminal #9 ( following a Drive Reset of course – depression of the Red button ).



If all works well – DON'T Forget to STORE !

Questions ?? Ask the Author:

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